Amendments to the Claims

This listing of claims replaces all prior versions and listings of claims in the application:

Listing of Claims:

1-110. (Canceled)

111. (New) A force sensor for sensing a touch force applied to a touch surface, the force sensor comprising:

a first element including a first capacitor plate at least a portion of which is an elastic element that allows the first capacitor plate to move; and

a second element including a second capacitor plate opposed to the first capacitor plate;

wherein transmission of at least part of the touch force through the elastic element portion contributes to a change in capacitance between the first capacitor plate and the second capacitor plate.

112. (New) The force sensor of claim 111, wherein the first element is substantially planar.

113. (New) The force sensor of claim 111, wherein the first capacitor plate and the elastic element are formed as a single integral piece.

114. (New) The force sensor of claim 113, wherein the elastic element defines an elevated feature of the first capacitor plate.

115. (New) The force sensor of claim 114, wherein the elevated feature is located at the elastic center of the first element.

116. (New) The force sensor of claim 111, further comprising force-receiving means for receiving at least part of the touch force into the first element.

117. (New) The force sensor of claim 116, wherein the force-receiving means comprises the elastic element.

118. (New) The force sensor of claim 116, wherein the force-receiving means comprises a feature formed into the first element.

119. (New) The force sensor of claim 116, wherein the force-receiving means comprises an elevated feature of the first capacitor plate.

120. (New) The force sensor of claim 116, wherein the touch surface is in communication with a region of a surface of the force-receiving means, and wherein the touch surface tends to remain in contact with the region of the surface of the force-receiving means when the position of the touch surface changes with respect to the force-receiving means.

121. (New) The force sensor of claim 111, further comprising force transmission means for transmitting at least part of the touch force to at least one structure other than the first element.

122. (New) The force sensor of claim 111:

wherein the second element comprises a planar support surface that includes a plurality of electrically conductive mechanical bearing contacts; and

wherein at least portions of the first capacitor plate are in contact with the plurality of mechanical bearing contacts to transmit force thereto.

123. (New) The force sensor of claim 122, wherein the second capacitor plate includes a second capacitive surface that is coplanar with the plurality of mechanical bearing contacts.

124. (New) The force sensor of claim 123, wherein the second capacitive surface and the plurality of mechanical bearing contacts are composed of the same substrate.

125. (New) The force sensor of claim 122, wherein the planar support surface is part of an interconnect system to transmit a signal developed in response to the change in capacitance between the first capacitor plate and the second capacitor plate.

126. (New) The force sensor of claim 111, wherein the first and second capacitor plates are separated by a volume, and wherein the ratio of the height of the volume to the volume's greatest breadth is less than 0.05.

127. (New) The force sensor of claim 111, further comprising force signal development means for developing a signal in response to the change in capacitance between the first capacitor plate and the second capacitor plate.

128. (New) The force sensor of claim 111, wherein the force sensor includes an axis of sensitivity that passes through the elastic center of the elastic element.

129. (New) The force sensor of claim 111, further comprising the touch surface, wherein the touch surface is a touch surface of a handheld device.

130. (New) The force sensor of claim 111, wherein the second capacitor plate is separated by a capacitive gap from the first capacitor plate, the length of the mechanical path defining the capacitive gap being no greater than one-fifth of the maximum distance between any two force sensors that are used in the touch location device to measure the touch force.

131. (New) The force sensor of claim 111, wherein the first capacitor plate includes a first capacitive surface, and the smallest rectangular parallelepiped that encloses the first capacitive surface, the elastic element, and the second capacitor plate has a greatest dimension that is at least five times its least dimension.

132. (New) The force sensor of claim 111, wherein the first capacitor plate includes a first capacitive surface and the second capacitor plate includes a second capacitive surface, at least a portion of the first element being in contact with at least one support region of the second element to transmit force thereto, the second capacitive surface being substantially coplanar with the at least one support region.

133. (New) The force sensor of claim 132, wherein the at least one support region is part of an interconnect system to transmit a signal developed in response to the change in capacitance between the first capacitor plate and the second capacitor plate.

134. (New) The force sensor of claim 111, wherein the second capacitor plate is separated by a capacitive gap from the first capacitor plate, the length of the mechanical path defining the capacitive gap being no greater than four times the maximum dimension of the volume of the capacitive gap.

135. (New) The force sensor of claim 134, wherein the second capacitor plate is separated from the first capacitor plate in the unloaded state of the force sensor by not more than 10 mils.

136. (New) The force sensor of claim 111, wherein the second capacitor plate is separated by a capacitive gap from the first capacitor plate, the aggregate normal component of the mechanical path defining the capacitive gap being no greater than twice the size of the capacitive gap.

137. (New) The force sensor of claim 136, wherein the average width of the capacitive gap in an unloaded state of the force sensor is not less than thirty times the average height of the capacitive gap in the unloaded state of the force sensor.

138. (New) The force sensor of claim 111, wherein the second capacitor plate is separated by a capacitive gap from the first capacitor plate, wherein the average width of the capacitive gap in an unloaded state of the force sensor is not less than thirty times the average height of the capacitive gap in the unloaded state of the force sensor.

139. (New) The force sensor of claim 111, wherein the force sensor has a normal stiffness not less than 0.5 pounds per mil.

140. (New) A force sensor for sensing a touch force applied to a touch surface, the force sensor comprising:

a first capacitor plate having an elastic element portion, the elastic element portion defining an integral elevated feature of the first capacitor plate, the elastic element portion receiving at least part of the touch force into the first capacitor plate; and

a second capacitor plate opposed to the first capacitor plate;

wherein transmission of at least part of the touch force through the elastic element portion contributes to a change in capacitance between the first capacitor plate and the second capacitor plate.

141. (New) The force sensor of claim 140, wherein the first capacitor plate is substantially planar.

142. (New) The force sensor of claim 140, wherein the elevated feature is located at the elastic center of the first capacitor plate.

143. (New) The force sensor of claim 140, further comprising force-receiving means for receiving at least part of the touch force into the first capacitor plate.

144. (New) The force sensor of claim 143, wherein the force-receiving means comprises the elastic element portion.

145. (New) The force sensor of claim 143, wherein the touch surface is in communication with a region of a surface of the force-receiving means, and wherein the touch surface tends to remain in contact with the region of the surface of the force-receiving means when the position of the touch surface changes with respect to the force-receiving means.

146. (New) The force sensor of claim 140, further comprising force transmission means for transmitting at least part of the touch force to at least one structure other than the first capacitor plate.

147. (New) The force sensor of claim 140:

wherein the second capacitor plate comprises a planar support surface that includes a plurality of electrically conductive mechanical bearing contacts; and

wherein at least portions of the first capacitor plate are in contact with the plurality of mechanical bearing contacts to transmit force thereto.

148. (New) The force sensor of claim 147, wherein the second capacitor plate includes a second capacitive surface that is coplanar with the plurality of mechanical bearing contacts.

149. (New) The force sensor of claim 148, wherein the second capacitive surface and the plurality of mechanical bearing contacts are composed of the same substrate.

150. (New) The force sensor of claim 147, wherein the planar support surface is part of an interconnect system to transmit a signal developed in response to the change in capacitance between the first capacitor plate and the second capacitor plate.

151. (New) The force sensor of claim 140, wherein the first and second capacitor plates are separated by a volume, and wherein the ratio of the height of the volume to the volume's greatest breadth is less than 0.05.

152. (New) The force sensor of claim 140, further comprising force signal development means for developing a signal in response to the change in capacitance between the first capacitor plate and the second capacitor plate.

153. (New) The force sensor of claim 140, wherein the force sensor includes an axis of sensitivity that passes through the elastic center of the elastic element portion.

154. (New) The force sensor of claim 140, further comprising the touch surface, wherein the touch surface is a touch surface of a handheld device.

155. (New) The force sensor of claim 140, wherein the second capacitor plate is separated by a capacitive gap from the first capacitor plate, the length of the mechanical path defining the capacitive gap being no greater than one-fifth of the maximum distance between any two force sensors that are used in the touch location device to measure the touch force.

156. (New) The force sensor of claim 140, wherein the first capacitor plate includes a first capacitive surface, and the smallest rectangular parallelepiped that encloses the first capacitive surface, the elastic element portion, and the second capacitor plate has a greatest dimension that is at least five times its least dimension.

157. (New) The force sensor of claim 140, wherein the first capacitor plate includes a first capacitive surface and the second capacitor plate includes a second capacitive surface, at least a portion of the first capacitor plate being in contact with at least one support region of the second capacitor plate to transmit force thereto, the second capacitive surface being substantially coplanar with the at least one support region.

158. (New) The force sensor of claim 157, wherein the at least one support region is part of an interconnect system to transmit a signal developed in response to the change in capacitance between the first capacitor plate and the second capacitor plate.

159. (New) The force sensor of claim 140, wherein the second capacitor plate is separated by a capacitive gap from the first capacitor plate, the length of the mechanical path defining the capacitive gap being no greater than four times the maximum dimension of the volume of the capacitive gap.

160. (New) The force sensor of claim 159, wherein the second capacitor plate is separated from the first capacitor plate in the unloaded state of the force sensor by not more than 10 mils.

161. (New) The force sensor of claim 140, wherein the second capacitor plate is separated by a capacitive gap from the first capacitor plate, the aggregate normal component of the mechanical path defining the capacitive gap being no greater than twice the size of the capacitive gap

162. (New) The force sensor of claim 161, wherein the average width of the capacitive gap in an unloaded state of the force sensor is not less than thirty times the average height of the capacitive gap in the unloaded state of the force sensor.

163. (New) The force sensor of claim 140, wherein the second capacitor plate is separated by a capacitive gap from the first capacitor plate, wherein the average width of the capacitive gap in an unloaded state of the force sensor is not less than thirty times the average height of the capacitive gap in the unloaded state of the force sensor.

164. (New) The force sensor of claim 140, wherein the force sensor has a normal stiffness not less than 0.5 pounds per mil.